UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/812,366	03/20/2001	Michael Cosman	T6825.DIV1	2802

7590 04/21/2004

EXAMINER
GOOD JOHNSON, MOTILEWA

Steve M. Perry
THORPE, NORTH & WESTERN, L.L.P.
P.O. BOX 1219
SANDY, UT 84091-1219

ART UNIT	PAPER NUMBER
2672	10

DATE MAILED: 04/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/812,366	COSMAN ET AL.	
	Examiner	Art Unit	
	Motilewa A. Good-Johnson	2672	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 February 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-15* is/are rejected.

7)☒ Claim(s) *16-27* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is responsive to the following communications: Application, filed 03/20/2001; Preliminary Amendment A, filed 09/04/2001; IDS, paper #5, filed 06/22/2001; IDS, paper # 6, filed 03/20/2001; IDS, paper #7, filed 12/03/2002.

2. Claims 1-27 are pending in this application. Claim 1 is an independent claim. No claims have yet been amended.

3. The present title of this application is "Anti-Aliased, Textured, Geocentric and Layered Fog Graphics Display Method and Apparatus" (as originally filed).

Oath/Declaration

4. The request for the deletion of an inventor in this nonprovisional application under 37 CFR 1.48(b) is deficient because: Applicant has not filed a petition under 37 CFR 1.48 and the required processing fee.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3 and 5-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hollis et al., U.S. Patent Number 6,580,430 B1, "Method and Apparatus for Providing Improved Fog Effects in a Graphics System", class 345/473, 06/17/203, filed

11/28/2000, in view of Heidrich et al., *Applications of Pixel Textures in Visualization and Realistic Image Synthesis,* ACM Symposium on Interactive 3D Graphics, 1999, pages 127-135.

As per independent claim 1, a method for simulating the effects of layered fog in a computer-generated synthetic environment . . . comprising the steps of: 1) selecting a plurality of sample points over an altitude range that corresponds to approximately one pixel height in display screen space for each of the adjacent pixels that lie on the boundary of the layered fog regions; (Hollis discloses determining a sampling position for pixels in a selected covered fog area or screen space, col. 11, lines 15-37 and Hollis discloses using the eye space Z and a range adjustment function, col. 11, lines 24-55) 2) calculating a layered fog density for each of the plurality of sample points; (Hollis discloses computing a fog density according to a fog type selected using Zn, which is computed by the range adjustment of the sample points, col. 13, lines 1-17) and 3) blending the layered fog density that is calculated for each of the plurality of sample point to thereby form an anti-aliased pixel layered fog density value for each of the adjacent pixels. (Hollis discloses the fog density is used for the percentage of fog color blended with the pixel, col. 13, lines 13-17)

However, it is noted that Hollis fails to disclose layered fog regions. Heidrich discloses layered fog and allowing the density to change as a function of height. It would have been obvious to one of ordinary skill in the art at the time of the invention to

include in the range adjustment sample area layered fog regions the layered fog concept to allow for non-constant fog in a scene.

With respect to dependent claim 2, utilizing a total of three sample points to represent the plurality of sample points selected from within each of the adjacent pixels that lie on the boundary of the layered fog regions. (Hollis discloses position where fog is sampled based upon one pixel covered, two pixels covered, three pixels covered, col. 11, lines 31-32)

With respect to dependent claim 3, selecting the adjacent pixels that lie on the boundary of the layered fog regions further comprises the step of selecting pixels that are separated by a distance of approximately one screen pixel. (Hollis discloses selecting a pixel that touches two neighboring pixels, col. 11, lines 31-32)

With respect to dependent claim 5, determining a sample altitude for each of the plurality of sample points. (Hollis discloses computing Zs for the sampling position, col. 11, lines 41-55)

With respect to dependent claim 6, determining a Z component of a scaled eye footprint vector for each of the plurality of sample points. (Hollis discloses multiplying Ze, the eye space of the pixel with a factor of the x location, therefore providing a scaled Z value of the eye space, col. 11, lines 60-64, it is inherent that the equation for the Z components disclosed in Hollis may be manipulated into vector format)

With respect to dependent claim 7, determining a length of an eye vector; determining a slope of an eye vector; determining an orientation of a polygon for which the sample altitude value is being calculated; and determining a total number of pixels

on a computer display. (Hollis discloses determining a center of the screen with respect to a coordinate system, which Examiner interprets to be inherent to determining a total number of pixels on a display, col. 11, lines 11-22, determining the ratio of the eye space for linear fog where the fog start and the fog end value, col. 10, lines 7-15, which Examiner interprets as determining the length and slope, blending the flog color as a function of a distance from a viewpoint to the pixels, col. 9, lines 63-64, which Examiner interprets as determining an orientation)

With respect to dependent claim 8, determining whether the eye vector has a primarily vertical direction or a primarily horizontal direction. (Hollis discloses using linear fog in which the fog equation from a starting point in a given viewpoint is at a constant increase, therefore providing a primarily vertical or horizontal direction, col. 10, lines 1-6)

With respect to dependent claim 9, determining the sample altitude primarily as a function of an orientation . . . when the eye vector has a primarily vertical direction; and . . . and as a function of a range of the polygon when the eye vector has a primarily horizontal direction. (Hollis discloses using the eye space z for fog calculations unless the viewer is facing the same direction and using the eye-space for determining a range that increases away from the Z axis, col. 10, lines 59-67, therefore providing the fog density as a function of the orientation with respect to direction of the eye space)

With respect to dependent claim 10, determining a pixel to eye vector; determining a polygon plane normal vector; determining the eye to pixel range; and determining a pixel size in radians; (However, it is noted that Hollis fails to disclose

determining a pixel to eye vector. Heidrich discloses using a spherical environment map and computing a reflection vector, a normal vector, a halfway vector and other vectors for each vertex, page 132)

With respect to dependent claim 11, determining a pixel size in radians further comprises the step of dividing a view frustum angle by a total number of vertical display pixels on the display screen. (Hollis discloses splitting the screen to the width of the screen plus the x offset to determining how the density changes, col. 11, lines 11-22, it is inherent that if the screen is split the pixel size can be determined by the split screen view)

With respect to dependent claim 12, calculating a unit vector that lies in a plane of the polygon and which points in a direction that is most aligned with the eye vector, or an eye footprint vector on the plane of the polygon. (Heidrich discloses a viewing vector and a orthographic point direction in the same direction of the eye space or viewpoint, page 132)

With respect to dependent claim 13, the step of calculating the eye footprint vector (F). (Hollis discloses computing a normalized halfway vector, page 132)

With respect to dependent claim 14, calculating a new vector by taking cross-product of the pixel to eye vector . . . wherein the eye footprint vector . . . (Hollis discloses the spherical parameterization for environment maps in which eye space normals are computed and using in yielding eye space normals for each pixel, page 132)

With respect to dependent claim 15, renormalizing the eye footprint vector, wherein renormalizing generates a renormalized eye footprint vector that has a unit length of one in the plane of the polygon. (Hollis discloses normalizing the eye space when the eye space is equal to the fog start and to a unit value of one, col. 11, lines 66-67)

Allowable Subject Matter

7. Claims 16-27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter: The prior art cited fails to render obvious the slant factor to obtain a scaled eye footprint vector, selecting the sample points as an indicated by Applicant, and the equations cited by Applicant for calculating a scaled eye footprint vector and an aggregate density to calculate a function six percent of an averaged exponentiated result.

Response to Arguments

9. Applicant's arguments filed 02/12/2004 have been fully considered but they are not persuasive.

Applicant argues that Hollis fails to disclose selecting a plurality of sample points over an altitude range that corresponds to one pixel height in display screen space for the adjacent pixels that lie on the boundary of the layered fog. Hollis discloses sampling of pixels and the position in screen space for the pixel sampled from an area covered, col. 11, lines 1-45. Applicant argues that the samples in Hollis are taken at the quad in the center of the screen. Hollis discloses the value is programmable to support split screen games, and thus provides quads for the center of the screen. However, Hollis discloses taking the samples from a covered area, which would include any area covered in fog including points over an altitude range, and the pixels in Hollis would include pixel attributes such as pixel height.

10. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., generating three layer model samples and blending the samples density values together) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

11. In response to applicant's arguments, the recitation preventing aliasing between layers of fog has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the

process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Applicant argues that although Heidrich discusses layered fog he fails to disclose a method for anti-aliasing the fog layers. Applicant does not claim antialiasing. Hollis discloses sampling fog and using the sampled fog points to generate a fog density and further discloses performing graphics pipeline processing of which antialiasing may be performed. Heidrich discloses layered fog as complex fog models, and because both disclose fog generation it is proper to combine the reference to create the features of the claimed feature.

Applicant argues that Hollis fails to disclose sample altitude for each of the sample points and that the sample altitude is the height above the simulated ground on the display screen. Hollis discloses sampling positions located in the screen space and depth Zs. Applicant argues the sample altitude is found with respect to world Z, however Applicant does not claim the limitation that the altitude is found with respect to a world z. Hollis further discloses a transform unit that performs transformation processing including object space to screen space, therefore making it obvious to perform transformations of the sample positions disclosed in Hollis for the desired operations and space.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Motilewa A. Good-Johnson whose telephone number is (703) 305-3939. The examiner can normally be reached on Monday - Friday 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Razavi can be reached on (703) 305-4713. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Motilewa A. Good-Johnson
Examiner
Art Unit 2672

mgj

MICHAEL RAZAVI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600